REMARKS

The Office Action dated May 14, 2008, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

By this Response, claims 13 and 25-26 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. Claims 27-36 have been added. No new matter has been added. Accordingly, 13-36 are currently pending in the application, of which claims 13 and 24-26 are independent claims.

In view of the above amendments and the following remarks, Applicant respectfully requests reconsideration and timely withdrawal of the pending objection to the Specification and the pending claim rejections for the reasons discussed below.

Objection to the Specification

The Office Action alleged that insufficient antecedent basis was provided for the claimed subject matter in the Specification. Specifically, the Office Action alleged that the Specification fails to define the term "computer-readable medium." Applicant respectfully traverses this objection for the following reasons.

Applicant respectfully submits that one of ordinary skill in the art with the disclosure of the Specification would have understood that a computer-readable program product is inherently embodied on a medium, such as a computer-readable medium.

Therefore, an explicit definition of the term "computer-readable medium" is unnecessary in view of such knowledge possessed by one of ordinary skill in the art.

Therefore, Applicant respectfully requests withdrawal of the objection of the Specification and respectfully submits that the Specification is in condition for issuance.

Claim Rejections under 35 U.S.C. §101

The Office Action rejected claim 24 under 35 U.S.C. §101 as being allegedly directed to non-statutory subject matter. Applicant respectfully traverses this rejection for at least the following reasons.

Applicant respectfully submits that claim 24 recites statutory subject matter directed to a computer-readable program product comprising a computer program code embodied on a computer-readable medium. As previously discussed above, one of ordinary skill in the art with the disclosure of the Specification would have understood that a computer-readable program product is inherently embodied on a medium, such as a computer-readable medium. Furthermore, MPEP §2106.01 explains that functional descriptive material, such as computer programs, that are recorded on some computer-readable medium becomes structurally and functionally interrelated to the medium and will be statutory in most cases since the use of the technology permits the function of the descriptive material to be realized. *See* *In re Lowry*, 32. F.3d 1579, 1583-84, 32 USPQ 2d 1031, 1035 (Fed. Cir. 1994). Therefore, contrary to the Office's conclusions, claim 24 is directed to statutory subject matter.

Therefore, Applicant respectfully requests withdrawal of the rejection of claim 24 under 35 U.S.C. §101 and respectfully submits that claim 24 recites claim limitations directed to a single statutory category within the requirements of 35 U.S.C. §101.

Claim Rejections under 35 U.S.C. §102(e)

The Office Action rejected claims 13-20 and 24-26 under 35 U.S.C. §102(e) as being allegedly anticipated by Sirosh (U.S. Patent No. 6,226,408) ("Sirosh"). The Office alleged that Sirosh discloses or suggests every feature recited in claims 13-20 and 24-26. Applicant respectfully submits that the claims recite subject matter that is neither disclosed nor suggested in Sirosh.

Claim 13, upon which claims 14-23 depend, recites a method. The method includes determining cluster centers in a first data structure. The first data structure includes a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. A plurality of the weight vectors represents a single non-linear cluster. The method further includes performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers, performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure, and determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The method is an unsupervised method that is configured

to be suitable for an on-line system.

Claim 24 recites a computer-readable program product comprising a computer program code. The computer-readable program product is configured to control a processor to perform determining cluster centers in a first data structure. The first data structure includes a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. A plurality of the weight vectors represents a single non-linear cluster. The computer-readable program product is further configured to control a processor to perform performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers, performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure, and determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. Executing the computer program is configured to carry out an unsupervised method that is configured to be suitable for an on-line system.

Claim 25 recites an apparatus. The apparatus includes first determination means for determining cluster centers in a first data structure. The first data structure includes a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. A plurality of the weight vectors represents a single non-linear cluster. The apparatus further includes first performance means for performing a first iterative process for iteratively updating the weight vectors such that the weight vectors

move toward the cluster centers, second performance means for performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure, and second determination means for determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The apparatus is configured to operate using an unsupervised method that is configured to be suitable for an on-line system.

Claim 26 recites an apparatus. The apparatus includes a first determination unit configured to determine cluster centers in a first data structure. The first data structure includes a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. A plurality of the weight vectors represents a single non-linear cluster. The apparatus further includes a first performance unit configured to perform a first iterative process to iteratively update the weight vectors such that the weight vectors move toward the cluster centers, a second performance unit configured to perform a second iterative process to iteratively update a second data structure utilizing results of the iterative updating of the first data structure, and a second determination unit configured to determine, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The apparatus is configured to operate using an unsupervised method that is configured to be suitable for an on-line system.

As will be discussed below, Sirosh fails to disclose or suggest every feature recited

in claims 13-26, and therefore fails to provide the features of the claims discussed above.

Sirosh is directed to an unsupervised identification of nonlinear data clusters in multi-dimensional data. Sirosh discloses a system including a vector quantization module, a weighted topology representing graph module, and an encoding module. The vector quantization module takes vector data inputs and extracts a group of inputs about a number of cluster centers, using a globally optimized clustering process. The weighted topology representing graph module creates a weighted graph of the vector space, using the cluster centers as nodes. The encoding module uses the weighted graph to recode the input vectors based on their proximity to the luster centers and the connectedness of the graph. The recoded vectors are re-input into the vector quantization module, and the process is repeated until termination, whereby the clusters identified may be highly non-linear in the original data space (Sirosh, Abstract; col. 2, lines 6-59).

Applicant respectfully submits that Sirosh fails to disclose or suggest every feature recited in claim 13, and similarly recited in claims 24-26. Specifically, Sirosh fails to disclose or suggest, at least, "performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers; performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure; and determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input

data points" as recited in claim 13, and similarly recited in claims 24-26 (emphasis added).

The Office Action alleged that Sirosh discloses the aforementioned claim features, citing column 4, line 64, to column 5, line 22, and column 6, line 22, to column 7, line 33. However, a review of these passages demonstrates that Sirosh fails to disclose or suggest the aforementioned claim features.

Rather, at column 4, line 64, to column 5, line 22, Sirosh discloses three process operating at each layer. The first process includes a vector quantization process 014 applied to input vectors V to place a set of cluster centers optimally in the D dimensional vector space. The second process includes linking the cluster centers into a topological graph 120 of the input space using a graph construction method.

During the graph construction, edges linking pairs of cluster centers are given *weights* that are inversely proportional to the number of vectors between them, so that the resulting weighted graph 120 represents both the topology of the input space and the local density of vectors between each of the cluster centers. Finally, using graph 120, the input data is encoded 108 into a new vector set 124, which represents both the proximity of the input vectors to respective nearest cluster centers, and how well connected the graph is in the area of each input vector (Sirosh, col. 4, line 64, to col. 5, line 22).

In particular, the encoding process 108 creates an encoded vector for each input vector with each cluster center in the current layer providing an output code as a vector component of the encoded vector. The output code for each cluster center is a function of

both topology of the graph and the connectedness of the input vector to the graph. In a preferred embodiment, each cluster center provides a vector component as a function of the distance of the cluster center to the input vector and a shortest path through the graph from the cluster center to the closest cluster center to the input vector (Sirosh, col. 4, line 64, to col. 5, line 22).

Sirosh fails to mention performing a first iterative process and a second iterative process as disclosed in claim 13, and similarly recited in claims 24-26. Rather, Sirosh merely discloses a single iterative process as described in column 4, lines 57-64. Sirosh, at column 4, line 64, to column 5, lines 31, describes the steps of the single iterative process.

Contrary to the Office Action's conclusions, Applicant respectfully disagrees that the teachings of Sirosh at column 5, lines 23-31 disclose a further iterative process. Rather, Sirosh discloses a set of encoded vectors 124 which are created by previous steps of the process and subsequently presented as input vectors to the next layer, e.g. the input for the second iteration of the single iterative process. Therefore, Sirosh fails to disclose or suggest, at least, "performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers; performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure" as recited in claim 13, and similarly recited in claims 24-26 (emphasis added).

Furthermore, Sirosh fails to mention that the weight vectors move toward the cluster centers. Sirosh merely discloses that an encoded vector for each input vector is created using the output code for each cluster center as a vector component. The output code relates to the distance of the cluster center to the input vector and a shortest path through the topological graph from the cluster center to the closest cluster center to the input vector. Accordingly, Sirosh fails no mention or suggest that the encoded vector, or even, the weighted edge linking pairs of the cluster center, described in column 5, line 1, "move toward the cluster centers" as recited in claim 13, and similarly recited in claims 24-26.

Furthermore, Sirosh, at column 5, lines 23-31, fails to disclose or suggest the aforementioned claim features. Rather, Sirosh, at column 5, lines 23-31, merely discloses that the set of encoded vectors 124 is presented as input vectors to the next layer. This process is iterative. The process reduces the number of cluster centers, thereby creating fewer, larger clusters of vectors in each layer. Each "new" cluster has a "new" particular cluster center. After each layer is processed, each of the input vectors is *associated with* the closest one of the cluster centers defined at the layer, thereby providing a classification of the input vectors in each layer.

Hence, Sirosh merely discloses redefined clusters having a particular cluster center for each layer processed, whereby each of the input vectors is *associated with* the closest one of the cluster centers defined at the layer. It would be improper to conclude from the teachings of Sirosh, particularly at column 5, lines 23-31, that "weight vectors move

toward the cluster centers" as recited in claim 13, and similarly recited in claims 24-26 (emphasis added).

Furthermore, Sirosh, at column 6, line 22, to column 7, line 39, fails to disclose or suggest the aforementioned claim features. Rather, Sirosh, at column 6, line 22, to column 7, line 39, merely discloses that a Batch Neural Gas takes into account the location of all input vectors when updating the cluster centers. A preferred implementation of a vector quantization process 104 using the BaNG algorithm is also discussed. For example, step 1 provides a random selection of a set of K data vectors as the initial cluster centers. The number K will depend on the current iteration of the overall hierarchal process. As a result of the process, the location of the cluster centers are normalized in the vector space, ensuring that the cluster centers are globally optimized, rather than merely locally optimized.

Hence, Sirosh fails to disclose or suggest that the selection of the set of K data vectors is determined based on the set of encoded vectors 124 presented as input vectors to the next layer, for which the Office Action, on page 5, indicated as the "second data structure." Therefore, Sirosh fails to disclose or suggest, at least, "determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points" as recited in claim 13, and similarly recited in claims 24-26 (emphasis added).

Accordingly, Sirosh fails to disclose or suggest every feature recited in claim 13, and similarly recited in claims 24-26.

Claims 14-23 depend from claim 13. Accordingly, claims 14-23 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicant respectfully requests withdrawal of the rejections of claims 13-26 under 35 U.S.C. §103(a), and respectfully submits that claims 13 and 24-26, and the claims that depend therefrom, are in condition for allowance.

Claim Rejections under 35 U.S.C. §103(a)

The Office Action rejected claims 21-23 under 35 U.S.C. §103(a) as being allegedly unpatentable over Sirosh, as applied to claim 14, and further in view of Guiver, *et al.* (U.S. Patent No. 5,809,490) ("Guiver"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Sirosh and Guiver.

Sirosh was discussed above. Guiver is directed to an apparatus and method for selecting a working data set for model development. Guiver discloses a data selection apparatus that augments a set of training examples with the desired output data. A data selection apparatus groups the augmented and normalized data set into related clusters using a clusterizer (Guiver, Abstract; col. 2, lines 19-29).

As previously noted above, Sirosh fails to disclose or suggest every feature recited in claims 13 and 24-26. Guiver fails to cure the deficiencies of Sirosh. Specifically, Guiver fails to disclose or suggest, at least, "performing a <u>first iterative process</u> for

iteratively updating the weight vectors such that the weight vectors move toward the cluster centers; performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure; and determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points" as recited in claim 13, and similarly recited in claims 24-26 (emphasis added).

Accordingly, Guiver in view of Sirosh fails to disclose or suggest every feature recited in claims 13 and 24-26. Claims 21-23 depend from claim 13. Accordingly, claims 21-23 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicant respectfully requests withdrawal of the rejections of claims 21-23 under 35 U.S.C. §103(a), and respectfully submits that claim 13, and the claims that depend therefrom, are in condition for allowance.

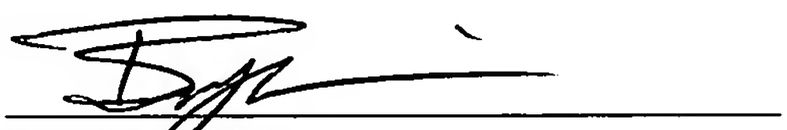
CONCLUSION

In conclusion, Applicant respectfully submits that Sirosh and Guiver, alone or in combination, fail to disclose or suggest every claim feature recited in claims 13-36. The distinctions previously noted are more than sufficient to render the claimed invention unanticipated and non-obvious. It is therefore respectfully requested that all of claims 13-36 be allowed, and this present application be passed to issuance.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicant's undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Enclosures: Petition for Extension of Time
Additional Claim Fee Transmittal
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